

**STATEMENT OF
GINA MCCARTHY, ADMINISTRATOR
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
COMMITTEE ON INDIAN AFFAIRS
U.S. SENATE**

September 16, 2015

Good afternoon Chairman Barrasso, Vice Chairman Tester and Members of the Committee. I am Gina McCarthy, Administrator for the U.S. Environmental Protection Agency. Thank you for the opportunity to appear today to discuss the August 5 Gold King Mine release and subsequent EPA response.

This was a tragic and unfortunate incident, and the EPA has taken responsibility to ensure that it is cleaned up appropriately. The EPA's core mission is to ensure a clean environment and protect public health, and we are dedicated to continuing to do our job to protect the environment and to hold ourselves to the same high standard we demand from others.

The EPA was at the Gold King Mine on August 5 conducting an investigation to assess mine conditions and ongoing water discharges, dewater the mine pool, and assess the feasibility of further mine remediation. While excavating above a mine opening, the lower portion of the bedrock crumbled and approximately three million gallons of pressurized water discharged from the mine into Cement Creek, a tributary of the Animas River. EPA and Colorado officials informed downstream

jurisdictions in Colorado within hours of the release before the plume reached drinking water intakes and irrigation diversions, and notifications to other downstream jurisdictions continued the following day, allowing for those intakes to be closed prior to the plume's arrival.

In the aftermath of the release, we initiated an internal review of the incident and released an Internal Review Summary Report on August, 26, which includes an assessment of the events and potential factors contributing to the Gold King Mine incident. The report provides observations, conclusions, and recommendations that regions should consider applying when conducting ongoing and planned site assessments, investigations, and construction or removal projects at similar types of sites across the country. The EPA will implement all the recommendations from the report and has shared its findings with external reviewers.

In addition to the internal review, the U.S. Department of the Interior is leading an independent assessment of the factors that led to the Gold King Mine incident. The goal of DOI's independent review is to provide the EPA with an analysis of the incident that took place at Gold King Mine, including the contributing causes. Both internal and external reviews will help inform the EPA for ongoing and planned site assessments, investigations, and construction or removal projects.

One of our foremost priorities is to keep the public informed about the impacts from the Gold King Mine release and our response activities. The EPA has closely coordinated with our federal partners and with officials in Colorado, New Mexico, Utah, the Southern Ute and Ute Mountain Ute tribes and the Navajo Nation to keep them apprised of water and sediment sampling results, which are routinely posted on our website. These results indicate that water and sediment have returned to pre-event conditions and supported local and state decision-makers as they made the decision to lift water restrictions along the Animas and San Juan Rivers on August 14 and August 15.

Finally, I want to clarify that the EPA was working with the state of Colorado to take action at the Gold King Mine to address both the potential for a catastrophic release and the ongoing adverse water quality impacts caused by the significant mine discharges into the Upper Animas Watershed.

Based upon 2009 – 2014 flow data, approximately 330 million gallons of contaminated water was being discharged from mines in the Watershed each year to Cement Creek and the Animas River – 100 times more than the estimated release from the Gold King Mine on August 5.

The EPA was and continues to work with the State of Colorado and the Animas River Stakeholder Group to address these significant discharges from mines in the Upper Animas Watershed that are impacting these waterways.

I think it is important to note, that all across the country, our Superfund program has successfully cleaned up more than 1,150 hazardous waste sites and successfully responded to or provided oversight for thousands of removal actions to protect human health and the environment. That reflects our long-standing commitment to protect human health and the environment that we will continue to pursue and continue to support the Administration's request for an Abandoned Mine Lands fee to help cover the costs of cleanups at these sites.

All of the affected residents of Colorado and New Mexico and members of the Southern Ute, Ute Mountain Ute, and Navajo Nation Tribes can be assured that the EPA has and will continue to take responsibility to help ensure that the Gold King Mine release is cleaned up.

Thank you Mr. Chairman that concludes my statement. I will be happy to answer any questions that you or the committee members may have.

GOLD KING MINE – WATERSHED FACT SHEET

Site Names: Upper Animas Watershed, Upper Cement Creek

City: Silverton

County: San Juan

Location: latitude: 37.8945° N; longitude: 107.6384° W; approximately 11,000 feet elevation

HISTORICAL BACKGROUND:

The Gold King Mine (GKM) was discovered by Olaf Nelson in 1887, with operations continuing until 1907 when a fire destroyed the surface buildings of the mine. The mine was reopened in 1910 but closed shortly thereafter because of litigation and labor problems. In 1918 a new company bought the mine and operated it until the fall of 1922. The GKM shipped 711,144 tons of gold and silver ore while in operation. The mine has been inactive since then. It is currently owned by San Juan Corporation.

The GKM is located in the Upper Animas Watershed in southwestern Colorado. These watersheds within the volcanic terrain of the San Juan Mountains contain some 400 abandoned and inactive mine sites, which have been the focus of both large- and small-scale mining operations between 1871 and 1991. The watershed consists of three main streams, the Animas, Cement Creek and Mineral Creek all of which drain the Silverton Caldera. The Animas River and many of its tributaries are historically impacted by high concentrations of heavy metals from both acid rock/mine drainage at mine sites and from naturally occurring metal loading sources not impacted by mining.

Mining operations contributed to metals loading to alpine streams and creeks adding to the natural metal loading already occurring in the mineralized area. As a common practice, mine tailings were directly deposited into the creeks and rivers until the 1930's. Water draining from the mines occurs when mining operations in the mountainsides alter the hydrology of the area and combine with natural springs, pulling water into mine tunnels. The water reacts with iron disulfide (pyrite) and oxygen to form sulfuric acid (acid rock/mine drainage). The resulting acidic water dissolves naturally occurring heavy metals such as zinc, lead, cadmium, copper and aluminum and results in water containing these metals flowing out of the mine adits (a horizontal shaft into a mine, which is used for access or drainage).

By the end of mining operations, many of the mines were left discharging contaminated water into streams. In 1991, the last big mine in the region, the Sunnyside, stopped mining. Its owner, Sunnyside Gold Corp., agreed not only to bulkhead (mine plug) its mine, but also to clean up abandoned mines nearby, while continuing to run the metal-laden waters of upper Cement Creek through a water treatment facility.

Sunnyside also reached an agreement with the state and Gold King mining to turn over its water treatment operations to Gold King. At that time, the GKM, like the nearby Red and Bonita mine, had not discharged any water. However, after Sunnyside closed, water found natural fractures that allowed it to flow into the GKM and Red and Bonita mines. Initially, these waters were run through the treatment plant that Sunnyside built, but Gold King ran into technical, financial and legal troubles and the treatment plant stopped operating.

The GKM is one of an estimated 23,000 abandoned mines dotting the state of Colorado. Of these abandoned mines, 6,127 have been made safe by the Colorado Division of Reclamation, Mining and Safety.

PREVIOUS WATER RELEASE INCIDENTS IN THE AREA:

1975 – A tailings pile on the banks of the Animas River northeast of Silverton was breached, dumping tens of thousands of gallons of water, along with 50,000 tons of heavy-metal-loaded tailings into the Animas.

1978 – Sunnyside Mine worker breached the floor of Lake Emma sending an estimated 500 million gallons of water through the mines, sweeping up huge machinery, tailings and sludge, and ultimately releasing through the American Tunnel to downstream waters.

SITE ASSESSMENT:

EPA and the Colorado Department of Public Health and Environment (CDPHE) conducted a Superfund Site Assessment of the area in the 1990s. The assessment showed that water quality standards were not achieved in the Animas River near Silverton and identified the severe impacts to aquatic life in the Upper Animas and its tributaries from naturally occurring and mining-related heavy metals. In recognition of the community-based collaborative effort, EPA agreed to postpone adding all or a portion of the site to the Superfund NPL, as long as progress was being made to improve the water quality of the Animas River.

Until approximately 2005, water quality in the Animas River was improving. However, since 2005, water quality in the Animas River has not improved and, for at least 20 miles below the confluence with Cement Creek and the water quality has declined significantly. Impacts to aquatic life were also demonstrated by fish population surveys conducted by Colorado Parks and Wildlife, which found no fish in the Animas River below Cement Creek for approximately two miles and observed precipitous declines in fish populations as far as 20 miles downstream since 2005.

Because of this declining water quality in the Animas River, in 2008, EPA's Superfund Site Assessment program began investigations in Upper Cement Creek focused on evaluating whether the Upper Cement Creek area alone would qualify for inclusion on the NPL. This evaluation indicated that the area would qualify, although after receiving additional community input, EPA postponed efforts to include the area on the National Priorities List. Since that time, EPA has continued and broadened its investigations of conditions at the site in order to understand the major sources of heavy metal contamination in the Upper Animas.

SITE RISK:

Mining operations have greatly disturbed the land, adding to existing highly mineralized conditions in many areas of the site. Mineralized waste rock exposed to air and water causes acidic conditions to mobilize the release of heavy metals to the surrounding environment. These heavy metals have found their way into the Animas River and its tributaries and have eventually traveled farther downstream.

Media Affected	Contaminants	Source of Contamination
surface water, subsurface water, surface soils and stream sediments	heavy metals – aluminum, lead, zinc, cadmium, copper, iron and manganese	historic mining activities and naturally occurring mineralization

CLEANUP PROGRESS:

Numerous mine reclamation and mine waste cleanup projects have been completed in the Upper Animas watershed over the last 20 years. These efforts have included diverting runoff away from and capping mine waste piles, moving mine waste piles away from drainages, consolidating mine waste piles and re-vegetating mine waste piles.

OTHER CLEAN UP EFFORTS:

The Animas River Stakeholders Group (ARSG), a collaboration between concerned citizens and representatives from industry and federal and state agencies, was created in 1994 to address the water discharges. The ARSG, along with federal and state agencies, continue to work to clean up the mines.

In addition, ARSG has been using a watershed approach and has developed a remediation plan, recommended feasible water quality standards (which were adopted in 2001) and has implemented remediation projects throughout the Upper Animas River Basin.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

SEP - 4 2015

MEMORANDUM

SUBJECT: Interim Guidance for Continuation of Work and Development of Comprehensive List of Superfund Mining and Mineral Processing Sites

FROM: James E. Woolford, Director
Office of Superfund Remediation and Technology Innovation

TO: Regional Superfund Program Managers
Regions 1-10

PURPOSE:

The purpose of this memorandum is to provide interim guidance for determining whether work at Superfund hardrock mining and mineral processing sites can proceed or if a work hold should remain in effect pending further evaluation of site conditions.

BACKGROUND:

On August 14, 2015, Reggie Cheatham and I issued a memo instructing regions to cease work and other related actions at mining/tailings Superfund sites in light of the Gold King Mine release in Colorado. The memo identified some work cessation exceptions based on ongoing risks. Regions immediately identified a number of sites where they had stopped work or did not initiate planned work.

To learn more about what caused the Gold King Mine release, the Assistant Administrator of the Office of Solid Waste and Emergency Response (OSWER) charged a team of EPA mining experts to carry out an internal review of the incident. The team conducted the review and documented its findings in an August 24, 2015, report to the OSWER assistant administrator. Based on the team's findings and recommendations, as well as ongoing analyses of existing mine information, the Office of Superfund Remediation and Technology Innovation (OSRTI) established a process to determine if work cessations at mining and mineral processing sites should remain in place or if site work can re-start. Regions may need to conduct similar analyses at additional sites; OSRTI will transmit specific information regarding this effort under separate cover. More details on the process to analyze sites where work ceased follow.

APPLICABILITY:

The process outlined below applies to sites at which EPA ceased field investigation work. The mine conditions categories may also apply to sites that are not currently on hold but have future planned work.

For this memorandum, OSRTI defines a hardrock mining/mineral processing site as "mining and mineral processing activities (e.g., extraction, beneficiation or processing of ores and minerals) that have or may have impacted lands, waters and surrounding watersheds."

ACTION PLAN:

- OSRTI, the regions (i.e., 7, 8 and 9), and the Agency's mining experts, and, for any removal actions, the Office of Emergency Management (OEM), will discuss the sites at which work is currently stopped or may be planned but has not yet started. The discussions will be framed around the internal review team's findings/recommendations memorialized in their August 24, 2015, report, including using a tiered approach to evaluate sites in terms of the three mine conditions in the table below.
- This analysis will lead to the development of site-specific recommendations to identify if site work can be conducted, or whether site work should not be carried out at this time, pending further investigation, possibly including additional information gathering and risk mitigation. The following table presents these situations in more detail:

Category	Mine Condition	Recommended actions
1.	Sites with no known water in the mine, or sites with fluids that have been well-characterized, including water levels, and present no known hazard with the potential to create an emergency.	No need for work stoppage at those sites and/or work can continue, based on a determination of low/no risk or based on closer examination of site-specific conditions.
2.	Sites with fluid mine waste where water pressure has not been characterized and it is not known if a hazard exists with potential to create an emergency.	Site work stoppage should remain in place. Information gathering needs to continue so that a conclusive site work cessation determination can be made
3.	Sites where uncharacterized fluid mine waste exists and there may be a probable hazard with potential to create an emergency.	Site work stoppage should remain in place pending review of site conditions and until adequate emergency planning has occurred.

- OSRTI senior management and regional senior program managers (i.e., division director or higher) will make a joint determination as to which of these categories applies to each of the 10 sites. For those sites falling into categories "2" and "3," where work stoppage should remain in effect pending further study, the region and OSRTI will specify what

actions/information/milestones are necessary to make a conclusive decision and/or to allow for work to restart or planned work initiated. The region will document these discussions and decisions in correspondence to the OSRTI office director. OSRTI will coordinate with OEM as appropriate for any removal sites.

- OSRTI is also continuing efforts to develop a solid "master" site list, closely coordinated with each region, to reconcile the various mining site lists (e.g., the national mining team's site lists, data pulled from the Superfund Enterprise Management System, etc.). The internal review team's findings/recommendations will guide these evaluations. The categories noted in the table above might apply to additional sites identified through the list reconciliation process and in the course of conducting additional regional discussions. We may need to modify those evaluation parameters, where appropriate, as the Department of Interior's and the EPA Office of the Inspector General's reports become available. We will address information on additional mines under separate cover.

I appreciate all of your hard work and patience in the aftermath of the Gold King Mine incident, and we look forward to continuing our joint effort with you to help protect human health and the environment through site cleanups. Please call Dana Stalcup at 703-603-8702 if you have any questions or need further assistance.

Attachment


cc: Mathy Stanislaus, OSWER
Barry Breen, OSWER
Nitin Natarajan, OSWER
Dana Stalcup, OSRTI
Reggie Cheatham, OEM



GOLD KING MINE STAKEHOLDERS ALERT AND NOTIFICATION PLAN

INCIDENT COMMAND GOLD KING (ICGK)
7 SEPTEMBER 2015

U.S. ENVIRONMENTAL PROTECTION AGENCY


Incident Commander, Chris Ruhl (R6)

9/7/15
Date


Deputy Incident Commander, David Ostrander (R8)

9/7/15
Date


Deputy Incident Commander, Peter Guria (R9)

9/7/15
Date





Incident: EPA Response to Gold King Mine Release Incident
Subject: Gold King Mine Stakeholders Alert and Notification Plan

Strategic Objectives:

1. Notify stakeholders throughout the entire watershed in Regions 8, 6 and 9 of any mine related activities that could potentially impact the watershed.
2. Intended to address the first level of notification and information sharing.

INTRODUCTION

The Gold King Mine Stakeholders Alert and Notification Plan will notify stakeholders throughout the entire watershed in Regions 8, 6 and 9 of any mine related activities that could potentially impact the watershed. The Plan also includes a "notification only" alert for non-mine related activities such as a rainfall event. The Plan in its current form will remain in effect as long as work is ongoing at the GKM site. The Plan is intended to address the first level of notification and information sharing. Beyond this initial notification, all parties are responsible for assessing the incident and determining additional needs for response and notification.

Planning Scenario: This Plan is not intended to take the place of emergency action plans, spill plans, normal reporting requirements or action necessary for life safety events.

The framework of this Plan is based on the assumption that existing flows in the Animas River will affect timing and dilution. At a measured flow of 1000cfs at the USGS gauging station on the Animas River below Silverton, a spill or runoff event will likely take approximately the times listed below for each reach of river.

1. 30 minutes: Mine Operations to Silverton City limits
2. 30 minutes: Silverton to entrance of Animas River canyon
3. 10 hours: Animas River Canyon to Bakers Bridge
4. 10 hours: Baker's Bridge to Northern Durango city limits
5. 6 hours: Northern Durango City Limits to Southern Ute Reservation Boundary
6. 12 hours: Southern Ute Reservation Boundary to NM State Line

ALERT LEVELS

Notification Only

- An identified non mine-site related event affecting Cement Creek or the Animas River that will not pose a physical or safety concern for downstream users, but may be perceived as a negative event by stakeholders, public, or the media.
- This could include a precipitation event causing discoloration of Cement Creek unrelated to mine operations, a storm event that may cause identifiable disturbance of sediment, or any other event that could cause limited discoloration of the Animas River.



Alert I

- An identified event at the mine site that is unlikely to cause any physical or safety concern, but may be negatively perceived by the public for impacts beyond Cement Creek.
- This could include a limited or temporary release of treated or untreated mine wastewater that may be identifiable through operator knowledge or observation or direct measurements of turbidity, or pH in mine waste discharge, that could occur anywhere above the USGS Gauging Stations before Silverton.
- This could also include identification of a storm event affecting mine site operations or causing significant runoff leading to discoloration through two or more reaches of the Animas River identified above.

Alert II

- An identified event that may have limited negative public perception for downstream users for physical and environmental effects.
- This could include a failure of treatment systems or storm event causing a shutdown of operations.
- This could include a surge of mine waste that overcomes current capabilities for a short period.
- This could include a major storm event that would mobilize sediment from several drainages and large amounts of mine waste sediment from the Animas River causing widespread identifiable turbidity and discoloration.

Alert III

- This will include all events that are or will likely cause large-scale environmental or physical safety effects.
- This will include events such as terrorism or an extreme vandalism event shutting down operations.
- This will include additional or imminent mine dump failures, catastrophic slope failure or similar event.

NOTIFICATION PROTOCOL

Notification Only

- On-site OSC to notify EPA ICP in Durango within 1 hour of identified event.
- EPA IC to determine need to log in daily Situation Report (SITREP).
- EPA ICP to E-mail stakeholder list (attached) by end of day.



Alert I

- On-site OSC to notify EPA ICP within 1 hour of identified event. Durango IC and Command Staff to be notified within 1 hour of EPA ICP notification.
- This event will be logged in daily SITREP.
- EPA ICP to E-mail to stakeholder list within one hour of EPA ICP notification.
- Stakeholder agencies should be notified by end of day or following morning if event occurs after 6PM.
- EPA ICP to hold strategy meeting and determine need for downstream monitoring or sampling.

Alert II

- On-site OSC to notify EPA ICP as soon as practical. Durango IC and Command Staff should be notified within 1 hour of EPA ICP notification.
- On-site OSC should attempt immediate phone contact with SJC EM or Sheriff. If unable, contact should be requested through radio link to CSP Montrose Dispatch Center.
- This event will be logged in daily SITREP.
- EPA IC to send E-mail to stakeholder list immediately upon EPA ICP notification.
- Stakeholder agencies should be verbally noticed within one hour of event. Only one contact per agency is necessary.
- EPA ICP to hold strategy meeting to determine downstream monitoring and/or sampling needs and activation of the JIC.

Alert III

- On-site OSC to notify EPA ICP as soon as practical. Durango IC and Command Staff should be notified immediately upon ICP notification.
- On-site OSC should attempt immediate phone contact with SJC EM or Sheriff. If unable, contact should be requested through radio link to CSP Montrose Dispatch Center.
- EPA IC should make notification to the National Response Center (800) 424-8802
- On-site OSC and EPA ICP should establish real-time communication.
- This event will be logged in daily SITREP.
- EPA IC to E-mail stakeholder list immediately upon EPA ICP notification.
- Stakeholder agencies should be verbally notified by EPA ICP as soon as practical. Only one contact per agency is necessary.
- EPA ICP to hold strategy meeting to determine downstream monitoring and/or sampling needs and activation of the JIC.
- EPA IC to schedule stakeholder briefing as soon as practical.



INCIDENT COMMAND TRANSITION PLAN

GOLD KING MINE RELEASE INCIDENT AMIMAS RIVER OPERATIONAL AREA 17 SEPTEMBER 2015

U.S. ENVIRONMENTAL PROTECTION AGENCY

Incident: EPA Response to Gold King Mine Release Incident

Subject: Reduction in Surface Water and Sediment Sampling Frequency

Executive Summary

Given the trend of analytical results for surface water towards pre-event conditions, analytical results that are below recreational screening levels and/or demonstrating minimal variability, the EPA Environmental Unit recommends a reduction in sampling frequency of surface water and sediment from the current daily sampling regiment to twice-a-week sampling. Details on how EPA will transition and reduce surface water and sediment sampling frequency is described herein.

Strategic Objectives:

1. Describe the reduction in frequency for surface water and sediment sampling and the organizational transition from incident management to project management while a Conceptual Monitoring Plan is developed.
2. Maintain consistent messaging while coordinating the notification to and participation of stakeholders within the operational area.

KEY POINTS

1. This proposed transition document is focused on river assessment/operations, and is not intended to address activities related to the stabilization of the release at the Gold King Mine.
2. Transition activities will include:
 - a. Coordination and communication with stakeholders and communities as needed.
 - b. Maintain an organizational structure designed to ensure management accountability for the continuing operations.
3. This Transition Document should be accompanied by a global message that explains and supports the transition from incident command to project management.
4. The transition organization will retain the capacity and flexibility to rapidly and effectively respond to concerns and/or issues raised by U.S. EPA, state, tribal and local partners.



BACKGROUND

While U.S. EPA was investigating the Gold King Mine near Silverton, Colorado on August 5, 2015, a release of mine wastewater occurred. The wastewater was released to Cement Creek, which then discharges to the Animas River. The release resulted in discoloration of the Animas River, temporarily making the river water a mustard-orange as the slug of mine water flowed downstream. The leading edge of the release passed through Durango, Colorado, and crossed the border into New Mexico where it eventually discharged into the San Juan River. As the slug of discolored water moved downstream in the waterways, State and local jurisdictions closed public water system intakes on the Animas and San Juan rivers. The state and local jurisdictions also issued advisories regarding recreational use of the rivers and private drinking water wells within the Animas River watershed. The slug of mine water contained levels of metals that resulted in a temporary increase in surface water metals concentrations above pre-incident levels and deposited sediment.

SUMMARY OF RESPONSE ACTIVITIES

U.S. EPA Regions 8, 6 and 9 have performed mitigation, sampling, and data evaluation activities since inception of the Gold King Mine Release Incident. U.S. EPA Headquarters and other U.S. EPA regions have supported the response, along with support from other federal and state agencies, tribal and local jurisdictional agencies.

Over 300 personnel have performed field response and/or engaged technical/scientific support throughout the response area. To date, U.S. EPA has collected over 700 surface water samples and approximately 500 sediment samples from the Animas and San Juan Rivers, between Cement Creek in Colorado and Lake Powell in Utah. U.S. EPA also collected water samples from private drinking water wells in the Animas River watershed at locations selected in conjunction with State environmental partners. U.S. EPA's mitigation activities to date include delivery of more than 800,000 gallons of potable water, and more than 2,299,278 gallons of livestock/agricultural water. U.S. EPA has also provided over 5,620 bales of hay for use as livestock food.

Situation Status

State and local jurisdictions have lifted water use advisories, including drinking water, for the Animas River watershed. The Navajo Nation has lifted restrictions on wells serving the Montezuma Creek Public Water System. The Navajo Nation has also opened the Fruitland Irrigation Canal and lifted agricultural restrictions for water use which serves 3 Chapter locations. Navajo Nation EPA has determined that water from the San Juan River meets the Navajo Nation's water quality standards for the limited use of irrigation. This conclusion is based in part on NNEPA's test results, which are consistent with those of other agencies testing the river.

DATA EVALUATION

Pre-Event Watershed Conditions

A variety of metals have been historically present in surface water within the Animas River, San Juan River and Lake Powell. U.S. EPA has identified that 4 of the metals including arsenic, cadmium, mercury and



lead have greater toxicity than other metals present in water discharged during the Gold King Mine Release Incident. These 4 metals are naturally occurring at relatively low levels in the waterways and were also present in the water discharged during the Gold King Mine Release Incident.

Due to changing weather conditions (i.e., spring snow melt, late summer dry season), the metals concentrations in surface water vary seasonally and annually. Discharges from historic mines throughout the Animas and San Juan watersheds also affect the concentration of metals in these waters.

Sampling Objectives

U.S. EPA developed data quality objectives (DQO) to evaluate human health risk for surface water and sediment along the Animas and San Juan Rivers affected by the Gold King Mine Release Incident.

Data Evaluation Criteria

EPA uses "recreational screening levels" as a comparator for Gold King Mine data. The recreational screening levels for metals were developed for the hiker/camper exposure to surface water and sediment. These screening levels represent levels that are without adverse effects over an extended period of time from a continuous 64-day exposure. The surface water recreational screening levels assumes that adults and children receive all of their daily water intake (2 liters/day) from the river over a 64 day period. This exposure is estimated for ten years as a child and 20 years as an adult for a total of 30 years of exposure. The sediment screening levels are based on a hiker/camper exposure to sediments alongside the riverbank, and represent a bounding estimate for recreational users; meaning they are more conservative than screening levels for fisherman, rafters, swimmers, or other recreational users of the river primarily because the consumption rates of water and sediment for these groups is higher.

Environmental Unit Evaluation of Results

Evaluating the affects to the waterways as a result of the Gold King Mine Release incident is based upon a comparison of analytical results for the 24 metals analyzed. The determination of impacts to the river is based upon a comparison of detected metal concentrations with site-specific pre-incident/background concentrations. Any metal detection that exceeded background levels was then compared with risk-based screening criteria for human recreational water use. Sample results will continue to be compared with the recreational screening levels for human recreational water use developed as described above.

Based on analytical data trends observed for samples collected, between 5 August 2015 through 6 September 2015, U.S. EPA expects that recreational or agricultural use of the San Juan and Animas Rivers will not result in adverse effects to humans, livestock and/or crops. The metal concentrations of the samples are below sediment/soil recreational screening levels, and remain at pre-event conditions.

Updated findings of analytical results will be provided as new data is received and evaluated. A watershed monitoring plan is expected to be developed and implemented based on discussion with the affected U.S. EPA Regions, U.S. EPA Headquarters, Tribal Nations, State and local partners. The anticipated Conceptual Monitoring Plan is expected to address sampling locations, matrices, analyses, and evaluation of the changes in surface water and sediment quality trends in the watershed as a result of the Gold King Mine Release Incident relative to pre-release historical data. Private groundwater wells in areas of the alluvium within 200 to 300 feet of the Animas River bank of the Colorado section of the waterway will continue to be evaluated.



U.S. EPA operations currently include treatment of water flowing from the Gold King Mine prior to discharge to Cement Creek. As a result, U.S. EPA anticipates that metals concentrations in surface water within the Animas River and San Juan River will remain at levels that are protective of human health for short-term recreational exposure, which assumes that adults and children receive all of their daily water intake (2 liters/day) from the River over a 64 day period for a period of 30 years.

ENVIRONMENTAL UNIT RECOMMENDATIONS

Given the trend of analytical results for surface water towards pre-event conditions, analytical results that are below recreational screening levels and/or demonstrating minimal variability, the EPA Environmental Unit recommends a reduction in sampling frequency of surface water and sediment from the current daily sampling regiment to twice-a-week sampling. If after a two week period, analytical results from the twice-a-week sample collection continue to demonstrate pre-event conditions, the sampling frequency will be reduced further to once per week starting on week 3, and then re-evaluated after week 4 to determine further sampling needs. A Conceptual Monitoring Plan is expected to be implemented based on discussion with the affected U.S. EPA Regions, U.S. EPA Headquarters, Tribal Nations, State and local partners.

FIELD OPERATIONS

A summary of the current and proposed operations is presented below in Tables 1 and 2, respectively.

Table 1 – Overall Response Operations				
Region	Surface Water and Sediment Sampling	Groundwater Well Sampling	Mitigation	Outstanding Commitments
8	Surface water/sediment sample locations daily.	Private drinking water well sampling in response to local request. Alluvium well sampling.	Potable water deliveries.	Sampling/analysis of groundwater wells. Assessment at locations with appreciable amounts of settled sediment, in response to local request.
6	Surface water/sediment sample locations daily.	Private drinking water sampling activities.	Livestock/agricultural water deliveries. Completed. Livestock food deliveries. Completed.	Sampling of finished water from public water systems.
9	Surface water/sediment sample locations daily or as conditions permit.	No well sampling activities.	Potable water deliveries. Livestock/agricultural water deliveries. Livestock food deliveries.	N/A



Table 2 – Proposed Transitional Operations			
Region	Operational Period #1 (2 weeks)	Operational Period 2 (2 weeks)	Post Transition Activities
8	Surface water/sediment sample locations. Decrease sample frequency to twice weekly. Alluvium groundwater sampling. Potable water delivery to locations in alluvial that exceeded MCL after second sample result. Assessment at locations with appreciable amounts of settled sediment, in response to local request.	Surface water sample locations. Decrease sample frequency to once weekly. Alluvium groundwater sampling, as needed. Assessment at locations with appreciable amounts of settled sediment, in response to local request.	Activities associated with treatment of the mine water will be addressed separately
6	Surface water/sediment sample locations. Reduce sample frequency to twice per week. Sampling of finished water from public water systems until complete. No planned mitigation activities.	Surface water/sediment sample locations. Reduce sample frequency to once weekly Sampling of finished water from public water systems until complete.	Sampling of finished water from public water systems until complete.
9	Surface water/sediment sample locations twice weekly or as conditions permit.	Surface water/sediment sample locations sample once weekly or as security conditions permit.	N/A

STAFFING AND MANAGEMENT

On September 2, 2015, Area Command and three separate Incident Command Posts were consolidated into a single Incident Command structure based in Durango, CO. Current staffing is down to approximately 75 people (EPA, EPA contractors, and USCG) from almost 300 personnel two weeks ago. With the recommended reduction of sampling activities staffing in the Durango ICP will continue to scale down. It is also anticipated that with the reduced frequency of sampling events proposed that the field activities could be adequately supported by the Regional Offices in lieu of the Durango ICP (e.g., Sampling on the Navajo Nation).

Incident Command recommends maintaining the ICP during the first week of the reduced sampling primarily to support communication with stakeholders. In the following two weeks, Incident Command recommends scaling down the Durango ICP further to primarily support Colorado field activities (i.e., mine activities) and serve as a clearing house for data from Regions 6 and 9 on an as needed basis. By the week of October 5, 2015 the ICP in Durango should be primarily staffed by Region 8 personnel. The ICP will continue to be well positioned to respond in the event of any subsequent releases from Gold King as EPA concludes wintering activities there over the next month.



Transition of communications and liaison functions are described in the Gold King Mine Public Affairs and Liaison Function Transition Plan.

CONTINGENCY PLANNING

The Gold King Mine Stakeholders Alert and Notification Plan is currently being implemented through Incident Command. The Plan provides for stakeholder notifications throughout the entire watershed in Regions 8, 6 and 9 of any mine related activities that could potentially impact the watershed. The Plan in its current form will remain in effect as long as work is ongoing at the Gold King Mine Site. ICP Durango will continue to support activities at the Gold King Mine Site and will maintain the ability to mobilize in the event of an incident that impacts the watershed.

PROPOSED SCHEDULE FOR TRANSITION

Beginning 9/21/15

- Reduction in field activities as described in Table 2 (above)
- Further reduction in personnel in Durango ICP
- Regional Offices work with Incident Command to determine an efficient operational structure, if any, to meet the needs of their respective areas of responsibility
- Coordination for the Conceptual Monitoring Plan

Beginning 9/28/15

- Continued contraction of Durango ICP aiming to primarily support Colorado activities (e.g., mine activities)
- Regional Offices work with Incident Command to determine an efficient operational structure, if any, to support respective sampling commitments.
- Continue coordination conference calls for field activities between Regions 6, 8, and 9

Beginning mid-October

- Begin to implement elements of the Conceptual Monitoring Plan
- Coordination between Regions 6, 8, and 9 facilitated through regular conference calls.
- Field sampling frequency is done on a weekly basis (or phased out)

Post-Gold King
Mine Release
Incident:
Conceptual
Monitoring Plan
for Surface
Water,
Sediments, and
Biology

EPA Draft

September 2015

I. Background – Gold King Mine Release Incident and Animas River Watershed Historic Conditions

On August 5, 2015, EPA was conducting an investigation of the Gold King Mine (GKM) near Silverton, Colorado to assess the on-going water releases from the mine, treat mine water, and assess the feasibility of further mine remediation. While excavating above an old adit, pressurized water began leaking above the mine tunnel, spilling about three million gallons of water stored behind the collapsed material into Cement Creek, a tributary of the Animas River (<http://www2.epa.gov/goldkingmine>). The Animas River originates in the mountain peaks northeast of Silverton, in San Juan County, Colorado. It ends in Farmington, New Mexico, where it empties into the San Juan River terminating in Lake Powell in Utah. The conceptual monitoring strategy outlined in this document is designed to collect data in these surface waterbodies potentially impacted by the GKM Release Incident. Because this watershed has been historically impacted by mining releases and natural mineralization and these releases continue today, difficulties exist in identifying and distinguishing potential impacts of the GKM Release Incident from the many other ongoing sources of impacts described in this section.

The upper reaches of the Animas watershed are heavily impacted by historic mining activities and natural mineralization. Many abandoned mines exist within a two-mile radius in the headwaters including: the Upper Gold King, American Tunnel, Grand Mogul, Mogul, Red and Bonita, Eveline, Henrietta, Joe and John, and Lark mines. Some of these mines have acid mine drainages that produce flows of between 30 and 300 gallons per minute that directly or indirectly enter Cement Creek and eventually reach the Animas River. These flows were occurring prior to the GKM Release Incident and are ongoing. As a result, numerous remediation activities have been initiated in the watershed. The Animas River Stakeholder Group, the Bureau of Land Management, the Colorado Division of Reclamation/Mining and Safety, and EPA Region 8 have completed remediation projects in the watershed (*EPA Region 8, Upper Animas Mining District: Draft Baseline Ecological Risk Assessment*, <http://www2.epa.gov/region8/upper-animas-mining-district-draft-baseline-ecological-risk-assessment>). The Colorado Department of Public Health and the Environment has developed more than twenty-five Total Maximum Daily Loads (restoration plans required for waterbody segments considered impaired under the Clean Water Act) to help guide restoration activities towards meeting water quality standards. However, for some waters, including Cement Creek, the State has followed procedures under the Clean Water Act to remove aquatic life support as a designated use for the waterbody because it is not an attainable goal (*Colorado Department of Public Health & Environment*, <https://www.colorado.gov/pacific/cdphe/tmdl-san-juan-and-dolores-river-basins>).

Though restoration activities and plans have been underway in the watershed, aquatic life uses in numerous segments of the watershed remain impaired by heavy metals (*Colorado Department of Public Health & Environment*, <https://www.colorado.gov/pacific/sites/default/files/Regulation-93.pdf>). The Animas River Stakeholders Group (ARSG), which updated a watershed plan for remediating historical mining sites in the Upper Animas River Basin in 2013, estimates that in recent years untreated acid mine drainage from Cement Creek alone has been in the range of 600-800 gallons per minute or about 314-420 million gallons per year, with increases in metals loadings observed 40 miles downstream

in the Animas River

(http://ofmpub.epa.gov/apex/grts/f?p=110:700:13401198170892::NO:RP,700:P700_PRJ_SEQ:62860).

This document describes post-release surface water quality, sediment quality, and biological community monitoring that will occur over the course of the year following the GKM Release Incident. Data collected over the next year will support an assessment of the changes in surface water and sediment quality since the GKM Release Incident across the full range of seasonal flow conditions. While this plan focuses on surface water and sediment quality, EPA is exploring a sampling regime for private drinking water wells. As part of its response to the GKM Release Incident, EPA has collected and tested more than 650 samples from private drinking water wells. The EPA is following up on 3 wells with exceedances of maximum contaminant limits (MCLs) for drinking water to determine if there is any connection to the GKM release. Currently, sampling of drinking water wells is not included in this plan. Recognizing continued interest, EPA is taking comment and input on whether further action is needed on private wells. The EPA would like stakeholder input on the frequency, duration, location and scientific basis for continuing sampling of private wells.

II. Context for Conceptual Monitoring Plan and Data Uses

This is a conceptual monitoring plan in that it outlines the objectives, boundaries, and guiding principles for this effort. This allows for stakeholder review and input prior to finalization of more detailed documents. It is not intended to replace a Quality Assurance Project Plan (QAPP) or Sampling and Analysis Plan; but rather, serves to direct the development of such.

The monitoring effort described in this document will gather comprehensive data that span the watershed potentially affected by the GKM Release Incident. These data may be useful for a variety of purposes for the EPA, States, Tribes, and stakeholders and serve to increase our understanding and characterization of conditions across the watershed. A variety of media will be sampled and the objectives of this study are described in Section III. This monitoring and associated assessment will not constitute characterization for the Clean Water Act (CWA) Section 303(d) and 305(b) assessment determinations or site assessment/remedial investigation purposes under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); however, these data may support such efforts. The EPA may use a variety of regulatory and response authorities to conduct studies, initiate cleanup actions, facilitate public participation, and otherwise contribute to the cleanup of watersheds contaminated with hazardous substances and wastes. The EPA has developed guidance for federal and state program managers on integrating waste and water program to restore watersheds, which can be found here: <http://www.epa.gov/superfund/resources/pdfs/cross-program.pdf>

This monitoring study is designed to collect data in the surface waterbodies potentially impacted by the GKM Release Incident to determine if water and sediment quality trends are similar to trends observed before the GKM release. While the latest monitoring information after the GKM Release Incident shows contaminant levels have returned to pre-spill levels, this study's monitoring information will serve to inform if these findings remain consistent across the range of annual flow conditions.

It is important to recognize that the information collected for this monitoring study may not be sufficient to attribute elevated contaminant levels or possible biological metrics to the August 5, 2015, GKM release. The limits of this study's data to provide release-specific attribution follow from the many years of historic mine drainage releases from the GKM, the ongoing acid mine drainage releases from other mines into the Animas River (and downstream water bodies) and the limited availability of pre-release water quality conditions.

Monitoring and assessment efforts occurring prior to the GKM Release Incident identified pre-existing impairments to water quality, sediment quality, and biological communities in this watershed. Numerous sources of metals contamination are present that have impacted environmental quality before the GKM Release Incident and continue to impact environmental quality post GKM Release Incident. Therefore, our ability to determine if current environmental impacts relate to the GKM Release Incident is confounded by the presence of these other sources, and typical conditions in many areas of this watershed are not pristine nor free of impairments. Any new data that are gathered can only be understood with respect to the GKM Release Incident by a comparison to previous conditions that reflect historic impairment sources. Hence, the ease of interpretation of data gathered under this strategy greatly depends on the amount and quality of historic data that are available for comparison. Sites, media, and analytes for which there are robust historic datasets for pre- and post-release comparison will be the most useful in understanding whether typical conditions in this watershed are being maintained after the GKM Release Incident. A comparison of current data to data collected under pre-release/historic conditions should allow for an understanding of whether there are changes in water quality and sediment quality trends post-GKM Release Incident over the next year or whether typical conditions are witnessed. Biological data are being collected as well; however, historic datasets are more limited and biological data are more difficult to interpret and compare. Therefore, the primary media to be used in determining maintenance of pre-release or historic conditions are surface water and sediment.

Some sites that do not have robust datasets will be sampled because they are necessary to provide a more complete geographic distribution of data collection under this strategy. Data for sites, media, and analytes, for which there is not a historic dataset for comparison, will not be useful for determining changes in environmental quality as a result of the GKM Release Incident and should not be used to this end. However, these data are important for increasing our understanding and characterization of the watershed with respect to the many complex existing contaminant sources and stressors that have been and continue to be present. These data serve to inform stakeholders of the environmental conditions across the wider watershed, begin the development of a historic data set for more locations in the watershed, and provide valuable information for decision makers.

After completing one year of monitoring under this plan, if results indicate a return to pre-release/historic trends, monitoring efforts under this plan will end and routine monitoring will continue per State, Tribal, and Federal program strategies and priorities. If pre-release/historic trends across the watershed are not maintained at some locations in the watershed, the EPA will conduct additional site-specific investigations as appropriate and use its authorities to work with other federal agencies, States, Tribes, and local entities to address these problems. The EPA is coordinating with its regulatory partners and affected stakeholders to understand other organizations' monitoring efforts, prevent duplication, and promote data sharing.

III. Objectives and Study Questions

This document outlines EPA's proposed conceptual monitoring strategy, assessment goals and general methods for evaluating surface waters, sediments, and biological communities downstream of the GKM Release Incident. This document outlines monitoring to be undertaken by the EPA and key stakeholders or regulatory partners that will support collaborative assessment of the pre- and post-release conditions. States and Tribes may consider this a framework for additional sampling that they wish to undertake.

The objectives of the monitoring strategy are limited in scope by the availability of historic or pre-release data. In this document pre-release data include results of sampling that occurred just prior to the GKM Release Incident. Historic data include longer term data sets that reflect many years of sampling and contaminant trends. Pre-release and historic data for metals in sediment, metals in water and biological assemblages are available for the Animas River in Colorado and Southern Ute Indian Reservation due to proximity of mine locations and past and continued interest in the effects of mining run-off. However, pre-release and historic data for both metals in sediment and water as well as biological information are less abundant further downstream on the Animas and San Juan River in New Mexico, Ute Mountain Ute Reservation, the Navajo Nation, and Utah. Due to the discrepancy of available pre-release and historic data and potential challenges faced by downstream states in assessing pre-release/historic trends with post-release conditions, two objectives for this study are proposed:

- **Objective A:** Identify changes in surface water or sediment quality trends since the GKM Release Incident in Cement Creek, Animas River, and the San Juan River by comparing post-release data against pre-release or historic trends. Only data that meet the requirements of Objective A, in that pre-release and post-release comparisons can be made, will be used to assess the changes since the GKM Release Incident.
- **Objective B:** Assess *only* current conditions of Cement Creek, Animas River, San Juan River, and Lake Powell where historic or pre-release data are absent or limited. Data solely collected to meet Objective B will not be sufficient in assessing the changes since the GKM Release Incident without additional information.

Objective A: *Identify changes in surface water or sediment quality trends since the GKM Release Incident in Cement Creek, Animas River, and the San Juan River at sites in Colorado, Southern Ute Reservation, New Mexico, Ute Mountain Ute Reservation, Navajo Nation, and Utah by comparing post-release data against pre-release or historic trends for all sampling sites possible. Only data that meet the requirements of Objective A, in that pre-release and post-release comparisons can be made, will be used to assess the changes since the GKM Release Incident. Include biological community and biological tissue data-set comparisons if historic datasets allow.*

The primary purpose of this objective is to identify changes since the GKM Release Incident that occurred on August 5, 2015 by comparing post-release data against pre-release or historic trends for each sampling location. The study questions identified below provide the context used in selecting sampling locations and analytes of interest for this objective.

For this effort, it is necessary that data be collected at sites for which historic and/or pre-release data trends are available so that historic and/or pre-release trends may be compared to the data collected through this monitoring effort. Potential sampling locations are identified in this document with emphasis placed on those sites for which historic data are available. Pre-release and historic data availability are understood for most of these potential sites or will be compiled and analyzed prior to final site selection. Stakeholders may have alternative (replacement) sites of interest for those identified in Table 2.

Assessment Objective A:

Compare pre-release (or historic) and post-release surface water data, sediment data and biological data of Cement Creek, the Animas River, and the San Juan River.

Study Questions – Objective A:

1. Have water and sediment quality trends in Cement Creek, the Animas River, and the San Juan River changed since the GKM Release Incident?
 - a. What are the water column and sediment metals concentrations/loadings and how do they compare to pre-release or historic trends?
 - b. What are the conditions of the biological communities, macroinvertebrates and fish, and how do the indices used to assess them compare to pre-release or historic conditions?
2. If post-release conditions are of lower quality than pre-release/historic trends, are water quality standards or screening levels exceeded for human health (including recreation and fish consumption), agricultural, and aquatic life uses in the watershed?

If metals concentrations in sampled media are higher than pre-release/historic trends, are they meeting screening levels identified as acceptable for recreation, agriculture, and aquatic life? Screening levels that may be used by EPA include those benchmarks identified as part of the GKM Release Incident emergency response and other water quality standards that apply.

Objective B: Assess *only* current conditions of the Animas River, San Juan River, and Lake Powell at locations in Colorado, Southern Ute Reservation, New Mexico, Ute Mountain Ute Reservation, Navajo Nation, and Utah at sites in which historic or pre-release data are absent or limited. Data solely collected to meet Objective B will not be sufficient in assessing the changes since the GKM Release Incident without additional information.

At stations that lack historical or pre-release data, a general assessment is proposed for Cement Creek, Animas River, San Juan River and including Lake Powell. The general assessment will not identify changes since the release but can be used to better understand overall conditions at these sites, which reflect all previous releases, discharges, spills, stormwater runoff and erosion over previous decades.

Assessment Objective B:

Identify current conditions of Cement Creek, Animas River, San Juan River and Lake Powell through the collection of surface water, sediment, and biological samples at multiple locations.

Study Questions – Objective B:

1. Do surface water and sediment in Cement Creek, Animas River, San Juan River and Lake Powell demonstrate exceedances of current criteria for metals and/or screening levels?
 - a. What are current metals in water concentrations and how do they compare to state water quality standards and/or screening levels?
 - b. What are current metals in sediment concentrations and how do they compare to recreational screening levels?
 - c. What is the current assessment of biological communities (macroinvertebrates and fish) for locations in which State/Tribal assessment methods are available?
 - d. How do current assessments compare to previous assessments (if available)?

IV. Monitoring Frequency and Analytes of Interest

The EPA anticipates that the sampling under this strategy will occur during the first year after completion of the GKM Release Incident response monitoring activities conclude. This monitoring and assessment effort will end after approximately one year if data confirm that pre-release trends or screening levels are maintained. A one-year monitoring duration was selected so that data may be collected across the full range of seasonal flow conditions. After completing one-year of monitoring under this plan, if results indicate a return to pre-release/historic trends, monitoring efforts under this plan will end and routine monitoring will continue per State, Tribal, and Federal program strategies and priorities. If pre-release trends are not attained and screening levels are exceeded, monitoring activities will be focused site specifically on areas of interest with the purpose of identifying sources and developing corrective actions. Potential sampling locations are identified below in Table 2, Section VI.

Table 1 summarizes the expected frequency of monitoring under this plan as well as the type of data to be collected. The full suite of metals that were monitored during the emergency response will be monitored under this strategy for consistency. However, not all of the metals monitored during the emergency response (and through this effort) are expected to be present in the GKM discharge. The primary metals of interest associated with the GKM include: aluminum, cadmium, copper, iron, lead, manganese, and zinc.

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Post-Gold King Mine Release Incident Conceptual Monitoring Plan
For Surface Water, Sediments and Biology

Table 1. Sampling and Monitoring Schedule For Potential Sampling Sites Listed in Table 2					
SAMPLING AND MONITORING SCHEDULE:	FALL 2015	MARCH 2016	SPRING/ JUNE 2016	SUMMER 2016	FALL 2016
WATER COLUMN - dissolved and total recoverable metals ¹ , dissolved organic carbon (DOC), total organic carbon (TOC), hardness	1 event	1 event: pre-snow melt	1 event: snowmelt runoff		1 event: low flow
SEDIMENT – total recoverable metals	1 event	1 event: pre-snow melt			1 event: low flow
BENTHOS AND FISH TISSUE – metals; Collect and assess in locations where historic data are available so that release effects can be assessed.					1 event: timeframe comparable to historic data
BIOLOGICAL COMMUNITY – benthic macroinvertebrate and fish populations – Collect and assess in locations where historic data are available and State/Tribal assessment methods are developed so that release effects can be assessed.	1 event				1 event
STORMWATER SAMPLING - dissolved and total recoverable metals ¹ and dissolved organic carbon (DOC) – Collect at sites on Animas in CO, Southern Ute, NM	1-2 (total across Fall 2015 and Summer 2016)			1-2 (total across Fall 2015 and Summer 2016)	
PHYSICAL HABITAT	Collected once at each site sampled for macroinvertebrates and fish – likely at fall event				
FIELD PARAMETERS –	All sampling events will include field parameters (pH, temperature, dissolved oxygen (DO), conductivity and turbidity) measured with a probe/sonde.				
FLOW –	Flow data will be measured via stream gage if present or by flow meter for all events.				
¹ Aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, sodium, thallium, uranium, vanadium, and zinc					

V. Site Selection and Assessment Approach

The following summarizes the site selection and general assessment approach for the watershed.

Sampling and monitoring location selection:

Currently, the EPA has identified 23 potential monitoring locations along Cement Creek, the Animas River, the San Juan River, and Lake Powell based upon locations used in the emergency response and long-term data availability. Reference/background sites necessary for state or tribal assessments may be necessary and require stakeholder input for identification. The detailed list of potential sampling locations is provided in Section VI, Table 2.

Assessment Summary:

For data interpretation, post-release monitoring data will be compared against historic data, pre-release metals levels, risk-based screening levels and/or applicable water quality standards. Biological community information will be compared against pre-release/historic data using State/Tribal assessment methods. Data assessment methods will be developed for each site based upon the quantity and quality of the historic data. For sites with more abundant historic data, a statistical analysis of pre- and post-release conditions may be possible. Sites with limited historic data may not be suitable for a statistical comparison of pre- and post-release conditions and may provide only a qualitative understanding of changes in water and sediment quality. For these sites, changes in impairment status under the Clean Water Act pre- and post-release may serve to inform whether further study is warranted for confirmation. It is anticipated that the following decision rules will apply:

General Decision Rules (primarily to be based on metals concentrations in water and sediment):

- **If the one-year monitoring study indicates that pre-release water quality and sediment trends are similar to trends observed prior to the GKM release:**
 - End monitoring under this plan and continue monitoring per State, Tribal, and Federal program strategies and priorities.; and
 - Communicate waterbody condition in comparison to water quality standards and/or screening level benchmarks to stakeholders.
- **If the one-year monitoring study indicates that pre-release water quality and sediment trends have degraded since the GKM release AND screening levels or water quality standards are exceeded:**
 - The EPA will conduct additional site-specific investigations as appropriate and use its authorities to work with other federal agencies, States, Tribes, and local entities to address these problems.
- **If the monitoring data for any site cannot be compared to pre-release conditions/historic data:**
 - Communicate waterbody condition in comparison to water quality standards and/or screening level benchmarks to stakeholders. Conditions will not be attributable to GKM Release Incident using these data alone.

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Screening Levels and Water Quality Standards:

Screening levels that were used for the GKM Release Incident response decisions will be used in data assessment under this strategy as well. Federally approved applicable State and Tribal water quality standards can be found at:

- State of Colorado –
 - [ftp://ft.dphe.state.co.us/wqc/wgcc/Current%20Water%20Quality%20Standards/Currently%20Effective%20Standards/34 SanJuan Effective 06-30-2015/34 2015\(06\)SBP.pdf](ftp://ft.dphe.state.co.us/wqc/wgcc/Current%20Water%20Quality%20Standards/Currently%20Effective%20Standards/34%20SanJuan%20Effective%2006-30-2015/34%202015(06)SBP.pdf)
- Navajo Nation –
 - <http://www.navajonationepa.org/Pdf%20files/Navajo%20Nation%20Surface%20Water%20Quality%20Standards%202007.pdf>
- Southern Ute Tribe -
 - Contact the tribe - <https://www.southernute-nsn.gov/environmental-programs/water-quality/> or EPA Region 8 – 303-312-6947
- State of New Mexico –
 - <http://164.64.110.239/nmac/parts/title20/20.006.0004.pdf>
- State of Utah –
 - <http://www.rules.utah.gov/publicat/code/r317/r317-002.htm>
- Ute Mountain Ute Tribe –
 - [http://www.utemountainuteenvironmental.org/umep/assets/File/Water/Surface%20Water%20Standards/UMU WQS 2011Revision 042011 supplimental.pdf](http://www.utemountainuteenvironmental.org/umep/assets/File/Water/Surface%20Water%20Standards/UMU_WQS_2011Revision_042011_supplimental.pdf)

VI. Potential Sampling Locations

Table 2 includes potential sampling locations for the monitoring described in this plan. Final site selection will be based upon the assessment needs and goals of EPA, key stakeholders and regulatory partners. Replacement sites with pre-release or historic data may also be considered. Section XI provides associated maps for these locations. Maps will be finalized once site selection is complete.

Site Name	Latitude	Longitude	Description/Location	Importance/Rationale
CC48 (EPA) / 09358550 (USGS)	37.819984	-107.663275	Cement Creek upstream of Silverton	Historic, long-term data record and release data available
A68 (EPA) / 09358550 (USGS)	37.811202	-107.659167	Animas River above Cement Creek in Silverton	Reference condition for this release; historic, long-term data record and release data available
A72 (EPA) / 82 (WQCD) / 09359020 (USGS) / 3611 (RW)	37.79027	-107.667578	Animas River at gage below Silverton, downstream of confluence with Mineral Creek	Historic, long-term and release data record available

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A73 (EPA) / 3442 (RW)	37.72215833	-107.65482778	Animas River upstream of Elk Creek	Historic, long-term data available; characterizes Animas before tributary influence
A75D (EPA) / 3438 (RW)	37.59793424	-107.77532681	Animas River upstream of Cascade Creek	Historic, long-term data record; characterizes Animas before tributary influence
Bakers Bridge (EPA) / GKM02 (EPA) / 88 (RW)	37.454134	-107.801601	Animas River at Bakers Bridge (CO Hwy. 250)	Historic, long-term and release data record available; pre-release water quality data available
9426 (WQCD) / 89 (RW)	37.38506	-107.83686	Animas River near Trimble at CO Hwy 252 Bridge	Historic, long-term data record available; mid-way between Bakers Bridge and Durango
32nd St. Bridge (EPA) / 3577 (RW) / 3717591075 20601 (USGS)	37.299991	-107.868199	Animas River in Durango at 32 nd St. Bridge	Historic, long-term and release data record available
Animas – Rotary Park (EPA) / 91 (RW) / 09361500 (USGS)	37.280718	-107.876927	Animas River at Rotary Park in Durango	Historic, long-term and release data record available
GKM05 (EPA)	37.268704	-107.885857	Animas River, south end of Durango near intersection of 160 and 550 above confluence with Lightner Creek	Release response site; unclear if long-term data available
GKM01 (EPA) / AR19-3 (SUIT) / Purple Cliffs (EPA) / 3713191075 15001 (USGS) / 3430 (RW) / 92 (RW) / NAR1 (SUIT)	37.221542	-107.859455	Animas River at Southern Ute Reservation boundary	Release response site; at CO/S. Ute Reservation border
AR 7-2 (SUIT) / NAR4 (SUIT)	37.084992	-107.878383	Animas River above confluence with Florida River	Historic data available
NAR 6 (SUIT)	37.024806	-107.8738	Animas River on Southern Ute Reservation just downstream of Heaven on Earth Road	Long-term data available, pre-release data available

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ADW-022 (EPA)	36.920559	-107.909909	Animas River at the Aztec Domestic Water System Intake	Pre-release data available
ADW-010 (EPA) / 09364010 (USGS) / 28.1 (NM) / 27.8 (NM)	36.837463	-107.991684	Animas River, mid-way between Southern Ute boundary and confluence with San Juan River	Pre-release data available
FW-040 (EPA)	36.783635	-108.102111	Animas River at confluence with San Juan River	USGS historic data available
SJLP (EPA)	36.73588701	-108.2539868	San Juan River below confluence with Animas River	Pre-release data available
SJFP (EPA) / NMRM-1005 (EPA) / 09367540 (USGS)	36.74815602	-108.4120157	San Juan River near Farmington, NM	Pre-release data available; historic data (National Rivers and Streams Monitoring Assessment) available
SJSR (EPA) / 09368000 (USGS)	36.78162422	-108.6927838	San Juan River near Shiprock, NM	Pre-release data available
SJ4C (EPA) / 09371010 (USGS) / 4954000 (UT)	37.000777	-109.029577	San Juan River just north of Four Corners on Ute Mountain Ute Reservation	Pre-release data available
SJME (EPA) / UTR9-0901 (EPA)	37.21681097	-109.19615	San Juan River near the confluence of McElmo Creek	Historic data (National River and Streams Monitoring Assessment) available; pre-release data available
SJBB (EPA) / UTRM-1009 (EPA) / 4953250 (USGS)	37.257527	-109.618941	San Juan River at Bluff, UT	Historic data available (National Rivers and Streams Monitoring Assessment and State of Utah); pre-release and response data available
SJIN (EPA) / 3712481103 - 95301 (USGS) / 5952590 (UT)	37.2536	-110.6632	Lake Powell site near San Juan inlet	Lake Powell site

Table 3 identifies historic data availability by site data type. Data availability will be confirmed prior to final site selection.

Table 3. Summary of historic data availability by site. Asterisks indicate immediately pre-release data are available.

Site	Water column - metals	Sediment - metals	Fish tissue - metals	Benthic tissue - metals	Macro-invertebrate population	Fish population
CC48	Yes	Yes	TBD	TBD	TBD	TBD
A68	Yes	Yes	TBD	Yes	Yes	TBD
A72	Yes	Yes	TBD	Yes	Yes	TBD
A73	Yes	Yes	TBD	TBD	TBD	TBD
A75D	Yes	Yes	TBD	Yes	Yes	TBD
Bakers Bridge	Yes*	Yes	TBD	Yes	Yes	TBD
9426	Yes	No	No	No	Yes	TBD
32nd St. Bridge	Yes*	Yes	No	No	Yes	TBD
Animas – Rotary Park	Yes	Yes	TBD	TBD	Yes	TBD
GKM05	Yes	TBD	No	TBD	TBD	TBD
GKM01	Yes*	TBD	No	TBD	TBD	TBD
AR7-2	Yes	Yes	TBD	TBD	Yes	TBD
NAR6	Yes*	TBD	TBD	TBD	TBD	TBD
ADW-022	TBD	TBD	TBD	TBD	TBD	TBD
ADW-010	Yes*	TBD	TBD	TBD	TBD	TBD
SJLP	Yes*	TBD	TBD	TBD	TBD	TBD
FW-040	TBD	TBD	TBD	TBD	TBD	TBD
SJFP	Yes*	TBD	Yes	TBD	Yes	Yes
SJSR	Yes*	TBD	TBD	TBD	TBD	TBD
SJ4C	Yes*	TBD	TBD	TBD	TBD	TBD
SJME	Yes*	TBD	Yes	TBD	Yes	Yes
SJBB	Yes*	TBD	Yes	TBD	Yes	Yes
SJIN	TBD	TBD	TBD	TBD	TBD	TBD

VII. Methods

The following analytical and field methods are proposed for sample collection and analysis under this monitoring strategy:

1. Dissolved metals in water:
 - ICP-MS Dissolved Metals in Water (EPA 200.8) and ICP Dissolved Metals in Water (EPA 200.7)
2. Total recoverable metals in water:
 - ICP-MS Total Metals in Water (EPA 200.8) and ICP Total Metals in Water (EPA 200.7)

3. Mercury:
 - EPA 245.1
4. Dissolved organic carbon (DOC):
 - EPA 415.2
5. Total organic carbon (TOC):
 - EPA 415.1
6. Hardness:
 - SM 2340B
7. Total recoverable metals in sediment:
 - ICP-MS Total Metals in Soil (EPA 200.8) and ICP Total Metals in Soil (EPA 200.7)
8. Field methods:
 - EPA Sampling Standard Operating Procedures: Emergency Response Team (ERT) Standard Operating Procedures (SOPs) for surface water and sediment.
 - EPA Region 8 Water Sampling Standard Operating Procedure (SOP) and Sediment Sampling SOP.
 - EPA ERT SOPs general website: http://www.epaossc.org/site/site_profile.aspx?site_id=2107
 - Surface water sampling SOP: <http://www.epaossc.org/sites/2107/files/2013-R00.pdf>
 - Sediment sampling SOP: <http://www.epaossc.org/sites/2107/files/2016-R00.pdf>
 - Macroinvertebrate sampling options – methods may vary by location
 - Use method used for historical data collection for historical comparability
 - Use EPA's National Rivers and Streams Survey Methods for longitudinal comparability
 - Fish community sampling options – methods may vary by location
 - Use method used for historic/pre-release data collection for pre-release/historic comparability
 - Use EPA's National Rivers and Streams Survey Methods for longitudinal comparability
 - Habitat Assessment options – methods may vary by location
 - Use method used for historical data collection for historic comparability
 - EPA's National River and Streams Survey Methods for longitudinal comparability
 - Fish tissue sampling – methods may vary by location
 - Use method used for historic data collection for historic comparability

VIII. Quality Assurance/Quality Control

A QAPP will be developed to describe the data quality objectives, the detailed sampling and analysis plan, field and laboratory quality control requirements, data handling and storage, standard operating procedures for field and laboratory activities, and other quality assurance requirements for this monitoring plan. This QAPP will conform to *QA/R-5 EPA Requirements for Quality Assurance Project Plans*.

The EPA anticipates using a single, National Environmental Laboratory Accreditation Conference (NELAC)-accredited lab that conforms to American National Standard ASQ/ANSI E4 quality assurance systems. Split samples may be provided to a second accredited laboratory for analytical verification.

IX. Data Management

The EPA anticipates using a single lab for metals analysis in order to facilitate data delivery and sharing. We also anticipate using an online SCRIBE database to share data and uploading the data to the EPA's STORET data warehouse for long-term storage.

X. Data Assessment

Objective A of this monitoring effort is to identify changes in metals concentrations in surface water and sediment since the GKM Release Incident in Cement Creek, Animas River, and San Juan River for at least one year after the end of the emergency response. Data assessment is described generally in Section V. Additional detail regarding data assessment approaches will be included in the Quality Assurance Project Plan and Sampling and Analysis Plan. Data assessment methods will be developed for each site based upon the quantity and quality of the historic data. For sites with more abundant historic data, a statistical analysis of pre- and post-release conditions may be possible. Sites with limited historic data may not be suitable for a statistical comparison of pre- and post-release conditions and may provide only a qualitative understanding of changes in water and sediment quality. For these sites, changes in impairment status under the Clean Water Act may serve to inform whether further study is warranted.

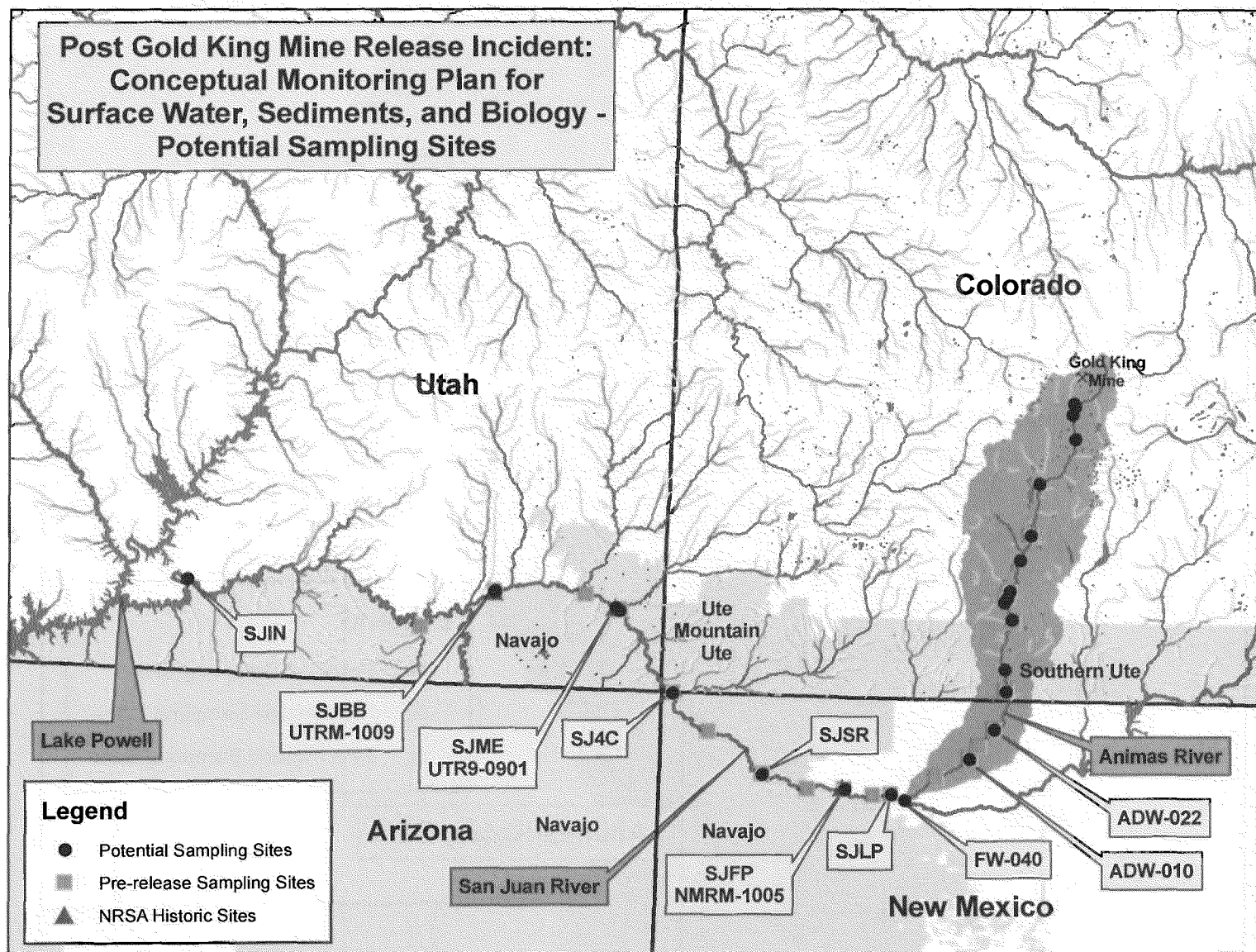
When completing condition assessments for either Objective A or Objective B, State and tribal assessment methods will be considered in assessing data against water quality standards. Available assessment methods include the following:

- State of Colorado –
 - <https://www.colorado.gov/pacific/sites/default/files/303dLM2016.pdf>
- State of New Mexico –
 - https://www.env.nm.gov/swqb/protocols/documents/2016_FINAL_AP_062215.pdf
- State of Utah –
 - http://www.deq.utah.gov/ProgramsServices/programs/water/wqmanagement/assessment/docs/2015/03Mar/303d_AssessmentMethodology.pdf

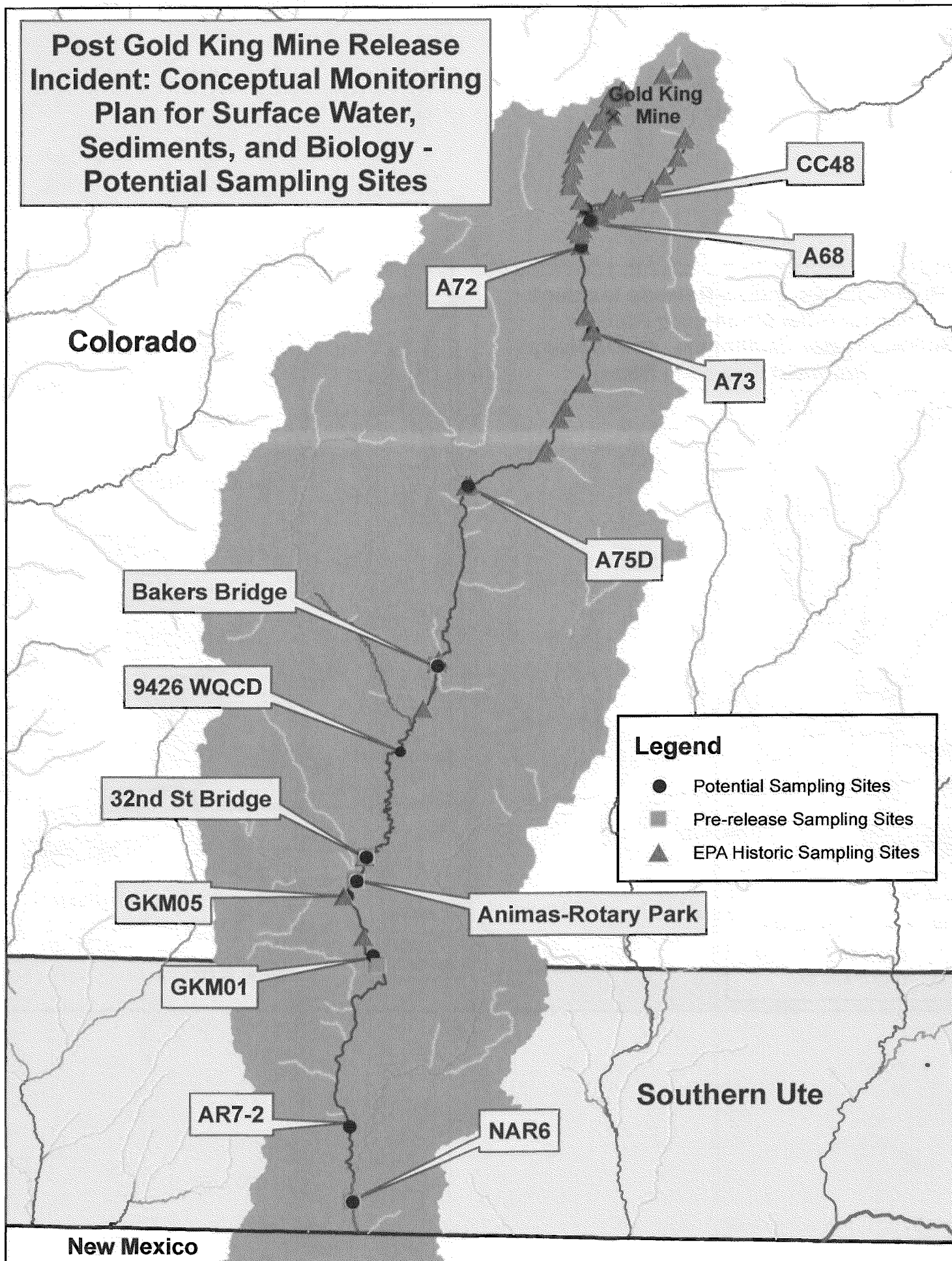
XI. Figures

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**Post Gold King Mine Release Incident:
Conceptual Monitoring Plan for
Surface Water, Sediments, and Biology -
Potential Sampling Sites**



**Post Gold King Mine Release
Incident: Conceptual Monitoring
Plan for Surface Water,
Sediments, and Biology -
Potential Sampling Sites**





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FOR IMMEDIATE RELEASE:

Sept. 23, 2015

EPA Announces Gold King Mine Water Treatment System for Winter 2015-16

(Washington, D.C.) -- The U.S. Environmental Protection Agency (EPA) announced today that a portable, temporary treatment system will be located in Gladstone, CO to continue treating water discharged from the Gold King Mine during winter 2015-16. This system will replace temporary settling ponds constructed by the EPA in August 2015.

The transition to the portable treatment system is necessary as winter temperatures at the mine site (elevation 10,500 feet) can reach -20F, making it unsafe to manually treat water at the mine site. The schedule calls for the treatment system to be operational by Oct. 14, 2015. EPA's contractor, ER LLC, awarded a subcontract Sept. 22, 2015 to Alexco Environmental Group (US) Inc. to complete the work.

This system will treat the approximately 550 gallons per minute (gpm) of water that continue to flow from the mine, including the discharges related to ongoing work in the mine to stabilize conditions. The system is designed to handle up to 1,200 gpm. The objective of the treatment system is to neutralize the mine discharge and remove solids and metals. Although the Gold King Mine discharge is just one of many into Cement Creek, the treatment will remove a portion of the metal loading to Cement Creek.

The EPA continues to evaluate data to determine the impact of the Gold King Mine on water quality.

Additional information about EPA's Gold King Mine response: www.epa.gov/goldkingmine

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